The impact of aid for trade on horizontal and vertical export diversification: The case of Sub-Saharan Africa and Developing Asia

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ABSTRACT

This work aims to identify the existing relationship between aid-for-trade flows and export diversification in sub-Saharan Africa and to develop Asia countries. The results of the estimate, conducted by the Generalized Moments Method (GMM) over the period 1995-2019, show a positive impact of Aid for Trade on horizontal and vertical diversification of exports for the entire sample, including positive and significant effects on per capita GDP growth, gross capital formation, commercial freedom, human capital, and population growth. In the sub-Saharan African sub-sample, Aid for Trade positively impacts vertical and horizontal diversification and the other variables, such as GDP by habitat, FDI, gross capital formation, and human capital; on the other hand, in the sub-sample of Asian countries, aid has a negative impact on horizontal and vertical diversification; moreover, GDP, FDI, gross capital formation, human capital, population growth, and inflation have a positive influence. Our study compared to previous studies mainly dealt with the "impact of aid on export diversification" aggregated forms, but this study fills the gaps in the literature by examining the impact of trade aid on diversification, from its vertical and horizontal dimensions and contribute to the improvement of knowledge in this field.

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Introduction

For many developing states that have seen their share in global trade and value-added drop, Aid for Trade initiatives has become an essential source of support in a context where they suffer from both market failure and government failure. The volume of Aid for Trade has grown more than tenfold over the past two decades to accelerate economic development in developing countries Cirera and Winters (2015).

Aid for trade is development assistance that specifically aims to ensure better conditions for international trade, for example, by improving the trade-related infrastructure needed to increase their trade opportunities and trade policy or by helping producers to meet export standards. If effective, it is expected to encourage structural change that increases income and integrates into the regulated multilateral trading system. Improving the productive capacities of firms in developing countries is seen as necessary for these countries to benefit from greater global trade openness initiated since the Washington Consensus (Stiglitz and Charlton, 2006).

Aid can, for example, promote the acquisition of new technologies by exporting firms in developing countries. Support for exporting firms can also take the form of export credit guarantees or technical assistance to obtain product certifications or produce goods that comply with international food safety standards (Cadot et al., 2014). And globally, it is widely recognized today that trade is an engine of productivity gains and growth. The Aid for Trade initiative launched at the World Trade Organization (WTO) Ministerial Conference in Hong Kong in 2005 was established in recognition of this evidence.

The objective of this initiative is "to help developing countries, especially LDCs, build the supply-side capacities and trade-related infrastructure they need to help them implement and benefit from WTO agreements and more broadly to expand their trade" (OECD,

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2013). This is because trade, particularly the expansion of exports, might increase the volume of existing export products and not necessarily increase new export products. Export expansion ultimately depends on the export development strategies with which Aid-for-Trade interventions align. The question of economic diversification, particularly the diversification of exports, has seen a renewed interest in the international debate and remains at the heart of the development agenda of the countries' political decision-makers (Gnangnon, 2018).

Many studies have explored the effectiveness of Aid for Trade, particularly in terms of the export performance of countries (Martínez-Zarzoso et Al. 2017; Martuscelli and Winters, 2014; Espoir Lukau, 2020). However, little attention has been paid to the impact of Aid for Trade on the export diversification of recipient countries, although authors like Gnangnon, 2018; Aye Mengistu (2009), and Munemo (2011) studied the impact of export diversification from comprehensive official development assistance.

Our work seeks to enrich the literature on the impact of trade aid effectiveness from the recipient countries perspective and by examining whether this aid influences vertical (transfer of resources from less productive to more productive sectors) and horizontal (dynamic non-traditional production (exports) of exports from sub-Saharan Africa and developing Asia recipient's countries. Our goal is to know and explain how Aid for Trade flows influence the horizontal and vertical diversification path of exports.

The empirical analysis is explicitly based on a sample of 46 countries in sub-Saharan Africa and 37 developing countries in Asia, excluding China (according to the World Bank ranking) beneficiaries of official development assistance (ODA) from 1995–2019.

Using the generalized methods of moments (GMM) econometric system, our results suggest that Aid for Trade is favorable to vertical and horizontal diversification of export products across the sample.

Still, for each subset of the sample, the impact is not the same. For developing countries in Asia, Aid for Trade is conducive to the vertical and horizontal diversification of export products because it increases the local added value and deepens integration into value chains and global markets. Contrary to the countries of sub-Saharan Africa, the results show that aid for trade is not favorable to the diversification of export, making the economies of the countries of sub-Saharan Africa less resistant against external and exogenous shocks.

Literature Review

Our discussion on the impact of Aid-for-Trade programs on export modernization, including diversification of export products, is drawn from the work of Aye Mengistu (2009), Cirera and Winters (2015), Gnangnon (2018). To measure the support provided by donors under the Aid for Trade agenda, only official development assistance earmarked for technical assistance and capacity building in the area of trade, economic infrastructure, and the strengthening of production capacity was taken into consideration (BIARDEAU, 2015). Since decolonization, assistance from industrialized countries to developing countries has been done mainly through official development assistance and financial aid.

While several countries benefiting from this aid have significantly improved their situation (particularly in Asia and Latin America), most African countries, almost 60 years after their independence (Biardeau, 2015), are still experiencing significant delays in development. Indeed, we note that despite high economic growth rates in most of them, the population's standard of living has not significantly improved, particularly in sub-Saharan Africa.

Aid for trade can enhance the diversification of recipient countries which may involve a radical change in their export structures into subsequent use of existing and new innovative export products through value-added enterprises such as processing and marketing. Believing Aid for Trade can boost the diversification (vertical and horizontal) of the recipient country's exports by changing their export structure. While horizontal and vertical diversifications aim to achieve three interdependent objectives: stabilization of income, an increase of export income, and enhancement of added value; however, the requirements for both can vary widely in terms of technological, managerial, and marketing skills (Aye, 2009).

Thus, vertical diversification involves a radical change in the structure of exports and subsequent use of existing and new innovative export products using value-added enterprises such as processing and marketing. On the other hand, horizontal diversification is achieved by producing dynamic non-traditional exports or partially replacing traditional and non-traditional exports (Jaime et al., 2018).

We hypothesize that the Aid for Trade program will contribute to the diversification of exports and recipient countries' economic and social development. In addition, we argue that Aid for Trade would influence the diversification of the exports of recipient countries through several mechanisms; an improvement in the education system may ultimately lead to an increase in the human capital of exporting companies, which promotes their development. The possible interactions between these aid propagation mechanisms can impact trade flows, promote liberalization of trade policy, and encourage FDI inflows and macroeconomic and political stability.

Therefore, carrying out analysis based on the components of Aid for Trade is likely to partially capture the impact of total Aid for Trade on the diversification of export products and ultimately counts as 1 impact of Total Aid for Trade on export diversification in recipient countries.

Moreover, as shown in the literature review carried out by Cadot et al. (2014), few studies assess the effectiveness and impact of Aid for Trade on export diversification of recipient countries. However, the small number of studies relating to specific cases does not allow definitive conclusions to be drawn on the effectiveness of these aids (cf. Cadot et al. 2014).

Aya (2009) analyzed the main determinants of vertical and horizontal export diversification for 41 countries in sub-Saharan Africa and East Asia over 1975-2004. The results of his study revealed that education, health and per capita income, population size, infrastructure development, and openness are crucial factors in inducing vertical and horizontal diversification of exports. FDI was a critical factor in accelerating vertical and horizontal export diversification in East Asia, but only for vertical diversification in SSA. The study also reveals that domestic investment plays a vital role in improving vertical and horizontal export diversification for East Asia. At the same time, it only induces horizontal diversification for sub-Saharan Africa.

The author, like Munemo (2011), studied the impact of the export diversification of global official development assistance (ODA) based on Aid for Trade commitments for the period 1996-2010; with a sample of 151 recipient countries; the results obtained in this study showed that Aid-for-Trade flows exert an impact on export diversification, with the caveat that this diversification has not extended to exports to very high-income countries.

While Gnangnon (2018) examining the impact of aid for trade on the diversification of export products in recipient countries, with an imbalanced data panel of 104 aid-for-trade recipient countries over the period 2002-2015. His study shows that Aid for Trade is conducive to the diversification of exports in recipient countries. In addition, there is a positive and significant effect of cumulative Aid for Trade flows on the diversification of export products to recipient countries.

Focusing on aid projects targeting productive capacities and trade policies for the period 2002-2009, Cali and te Velde (2011) conclude that aid for trade not only reduce transaction costs addition it also has a significant impact on the exports of recipient countries, primarily when the aid aims to develop infrastructure. The authors stress that aid intended for exporting firms only has a significant impact on specific sectors of activity, suggesting the possible existence of a selection bias towards productive sectors.

Helble et al. (2012) use the disaggregated aid flows from 1990 to 2005 and the trade flows of 167 importers and 172 exporters to show that aid aimed at facilitating trade is significantly linked to an increased inflow. Commercial. Thus, one dollar of Aid for Trade is associated with an increase in the recipient country's exports of \$ 1.33.

These positive effects of aid on the recipient country's exports can be found in other studies. For example, Klinger et al. (2011) find different effects of aid on developing country exports across continents. Thus, a dollar hike in aid to Africa only increases its exports by \$ 0.16. In contrast, the impact is stronger for Asia (\$ 3.22) and Latin America and the Caribbean (\$ 2.98). Hühne et al. (2014) study the effects of aid for trade from all DAC donors on recipient country exports and imports to all donor countries. The authors find that Aid for Trade increases both recipient countries' exports to donor countries by 5% and their imports by 3%.

Another positive impact of aid can come from foreign direct investment (FDI), which promotes trade. Indeed, aid for trade may relate in part to institutional changes that will impact FDI. Multinational firms may decide to locate in countries respecting intellectual property rights (Maskus, 1998; Smarzynska Javorcik, 2004a). Under certain conditions, these FDI can increase the productivity of local firms (Smarzynska Javorcik, 2004b), which could positively impact the exports of developing countries. The establishment of multinational firms in developing countries could increase trade in developing countries (e.g., Mayneris and Poncet, 2013). The empirical literature on the impact of aid on the exports of recipient countries also generally finds a positive and significant effect (OCDE, 2020). according to Biarreau, L. and A. BORING (2015), aid for trade was to increase trade, no longer by promoting the exports of donor countries via tied aid, but by reducing trade-related costs and improving the productive capacities of exporting firms in developing countries.

Other global studies focus on aid to reduce trade costs. Development assistance devoted to trading facilitation has been widely studied, albeit using very different definitions. It is generally concluded that improved trade facilitation measures are associated with higher trade flows (Keith., 2013). Customs reforms aimed at improving customs efficiency, lowering the costs of border transactions, eliminating bureaucratic interventions that lead to corruption, and adopting procedures to speed up the passage of goods at the border can reduce the burden on the border—trade costs for both importers and exporters.

Helble et al. (2012) analyze these potential gains using gravity estimates from cross-country regressions, focusing primarily on Aid for Trade. In particular, they compare the effects on bilateral trade flows of trade-related development assistance (i.e., building productive capacities), aid for trade policy, and aid for infrastructure. They conclude that Aid for Trade policy and regulatory reform

projects has a high rate of return. They estimate that US \$ 1 in Aid for Trade spent on trade policy and regulatory reforms can generate the US \$ 1.3 in an additional trade¹.

Cali and te Velde (2011) also find a strong correlation between aid and lower trade costs: a US \$ 1 million increase in Aid for Trade devoted to trading facilitation is associated with a decrease in trade facilitation. 6% of the costs associated with packaging the goods, loading them into a container, transporting the cargo to the port of departure, and loading it on board a ship or truck.

Finally, Cirera and Winters (2015) explored the effectiveness of Aid for Trade in terms of structural transformation in Sub-Saharan African Economies (SSA). They got factors other than Aid for Trade to explain the different experiences related to structural change in these economies. On another note and in contrast to previous studies, they found no significant impact of Aid for Trade flows on trade costs and trade flows in the economies of sub-Saharan Africa.

Concerning the above, we conclude that the impact of all Aid-for-Trade interventions on the diversification of export products depends on the export strategy of the beneficiary countries, which in some countries could be the specialization of export products and diversification of export products among others. And also, when the recipient countries have a favorable business environment, in particular stable macroeconomic policies and an investment climate conducive to encouraging private investment. We rely in our analysis on only official development assistance earmarked for technical assistance, and capacity building in the area of Trade, economic infrastructure, and strengthening of productive capacity was taken into consideration instead. Then on each Aid-for-Trade category.

This assistance had several objectives, the main one being socio-economic development. Indeed, the objective of any ODA is to raise the standard of living of the beneficiary populations to reduce poverty. To do so, we must develop the country's infrastructure, establish the foundations of the national industry through the creation of businesses, improve educational structures and finally increase national production.

Regarding export diversification, our study will use the two forms of export diversification, which are well known, namely, horizontal and vertical diversification. Horizontal diversification can be materialized by a greater mix of diverse and complementary activities within agriculture; and a shift from low-value agriculture to high-value agriculture. On the other hand, an economy is said to be vertically diversified if and only if that country begins to process and export value-added products that would previously have been exported in raw forms (Aye, 2009).

Compared to previous studies have mainly dealt with the "impact of aid on export diversification" aggregated forms, but this study fills the gaps in the literature in examining the impact of trade aid on diversification from its vertical and horizontal dimensions.

Research and Methodology

Estimate Model and Data

To empirically assess the role that aid for trade can play, alongside other factors, in the process of vertical and horizontal diversification of exports, we opted for the Generalized Moments Method from 1995-2019. We use data collected from several sources ((UNCTADstat, World Development Indicators, Heritage Foundation); (more details in appendix)) on a panel of forty-six (46) sub-Saharan African countries and thirty-seven (37) Asian countries (countries ranked by the World Bank on developing countries) covering the period between 1995-2019. The model used in this work is inspired by the empirical literature on the subject. More specifically, it is based on work (Gnangnon (2018); Gnangnon & Roberts, (2015) (2017); Aye, (2009)). We consider the following specification:

$$DH_{it} \text{ or } DV_{it} = \beta_0 + \beta_1 HLP_{it} + \beta_2 DEG_{it} + \beta_3 GDP_{it} + \beta_4 FDI_{it} + \beta_5 HUM_{it} + \beta_6 IFL_{it} + \beta_7 POP_{it} + \beta_8 FBC_{it} + \beta_9 INTS_{it} + \mu_i + \gamma_t + \omega_{it}$$

where DH_{it} or DV_{it} Represents respectively horizontal and vertical diversification of exports.

The μ_i are the country-specific fixed effects errors μ and λ_t the temporal effects at t finally ω_{it} Represents the error term.

Vertical diversification (DV): A growing export orientation of the manufacturing sector, accompanied by a share of manufactured goods in total exports, is part of the "normal" pattern of change in the growth process of developing countries. Since vertical diversification mainly involves primary exports to manufactured exports, it can be measured by the share of manufactured exports in total exports. (Munemo et al., 2007; Osakwe, 2007; and others).

The horizontal diversification (DH): the study was approximated by the number of export products (varieties) classified by the Standard International Commercial Classification (SITC) at the three-digit level. Thus, the maximum value of the index is 239, and

¹ In their widely cited working paper, where they employed a different method, Helble et al. (2009)

Calculated that the associated increase was nearly US \$ 700. This estimate is revised downwards in the published article.

its minimum (theoretical) value is zero for a country without exports. In other words, this simplified method makes it possible to measure the extent to which a country has widened the range of its products for export.

Per capita income growth is measured by (GDP / capita) : It is expected from convergence theory that the coefficient of this variable would be negative. The first lag in real GDP per capita is used as an indicator of the initial GDP per capita. Several empirical studies have shown that export diversification helps boost per capita income growth. In addition, Gutiérrez de Piñeres and Ferrantino (2000) found a positive interaction between export diversification and economic growth in their study of Latin American countries.

Official development assistance (HLP) : represents the variable measuring Net ODA received per capita. The primary measure of government spending in industrialized countries on behalf of developing countries has long been ODA. This is also the data used by aid impact studies at the aggregate level. ODA includes grants and concessional loans aimed at supporting the development of the assisted countries. Bilateral outflows cover a wide range of expenses, including expenditure items such as debt cancellations, costs charged to students from assisted countries within donor countries, technical cooperation, or administrative costs from donor countries. Official Development Assistance (ODA) consists of loans and grants made by the public sector with the primary purpose of promoting economic development and the well-being of developing countries. Aid for trade is a sub-category of ODA that falls under the following four categories: trade policy and regulation, economic infrastructure, productive capacity building, and trade-related adjustment (OECD, 2017).

Trade policy is measured by the variable Degree of freedom to trade (DEG): A degree close to 100 means that trade is easy and without any legislative or regulatory limits. The Heritage Foundation developed this indicator in partnership with the Wall Street Journal. The Heritage Foundation is a research and education institution founded in 1973 whose mission is to formulate and promote conservative policies based on the principles of free enterprise. It is an important component of the Index of Economic Freedom (EFW). Compared to other trade policy measures, it has the advantage of encompassing both tariff and non-tariff measures that affect trade. It also provides an annual “absolute” rather than “relative” measure of the Degree of trade liberalization of a given country.

The level of human capital is measured by the level of education, noted “HUM.” The latter is approximated here by the average gross enrollment rate in secondary schools. Indeed, a high level of human capital reduces the concentration of exported products (Agosin et al., 2012; Elhiraika and Mbate, 2014). This is because human capital accumulation allows countries to change their patterns of specialization from commodities to manufactures or services with a greater input of knowledge.

The size of the total “POP” population: according to the authors Vergne and Ausseur (2015), the new theories of international trade, the size of the market measured by the population can be an obstacle to the diversification of the productive system because it prevents the achievement of the economies of scale that characterize modern sectors. There is a consensus in the literature that countries rich in natural resources, like African countries, concentrate their exports on primary commodities. This largely explains the low diversification of their export portfolio (Gnangnon, 2018).

“INST” is the measure of the institutional quality of a country. Failed institutions can create uncertainty among producers and discourage them from investing and innovating over the long term (Faruq, 2011). Several studies on the determinants of the valuation of exports (Amighini & Anfilippo, 2014; Faruq, 2011; Gnangnon and Roberts, 2017) have empirically demonstrated the importance of good and quality governance for modernization. of exports, including diversification of export products. In this context, we expect that good institutional quality would be conducive to the diversification of export products.

Gross capital formation: captures the investment.

Foreign direct investment: The positive link between FDI and export performance is the result, essentially, of two main channels. First, the export activities of multinationals; when a multinational produces more diversified goods than national/local firms, this implies a greater diversification of the exportable offer of the host country. Second, the spillover effects; Through the indirect link with multinationals, local firms acquire new or more advanced capacities to produce and export products that they could not produce previously caused a lack of capacities (Hidalgo, 2011).

Inflation (IFL): Macroeconomic stability plays a key role in the success of diversification efforts. Macroeconomic stability provides the private sector with an environment in which entrepreneurs and consumers can plan and invest and focus on production and performance rather than the environment in which they operate. Macroeconomic instability, such as high levels of inflation, damage the prospects for diversification, and the tendency under such circumstances is towards concentration with little openness to new export sectors. We also expect inflation to have a negative relationship with export diversification; as predicted by many traditional economic theories, inflation makes domestic products less affordable than foreign products and, by the way, deters exports and export diversification.

Findings

Figure 1 presents the indicator on two sub-samples, namely AD and SSA (i.e., developing countries in Asia without China and countries in sub-Saharan Africa) the evolution over 1995-2019 of the average Aid for Trade (real values of Aid for Trade in millions of constant 2014 dollars) and of the average export diversification indicator. The figure shows that the index of concentration of export products fluctuated slightly in both AD and SSA over the whole period. This is not surprising as it takes time for countries to diversify their baskets of products export. However, SSAs have shown a higher degree of concentration of export products than DAs, meaning that DAs have much more diverse export baskets than SSAs. At the same time, the average real Aid for Trade values in SSAs and ADs did not change in the same way between 1995 and 2019. As we can see from the descriptive statistical table in the annex, African countries receive more trade aid compared to Asian countries. In particular, actual Aid for Trade has varied, showing an increasing trend over the period, especially for SSA. For SSAs, it fell from \$ 310 million in 1995 to \$ 190 million in 2000; it dropped from 200 million in 2001 to 490 million in 2019. While for AD, aid support remained stable over the period 1995 to 2019, there was a slight increase in 2013.

Figure 1: Aid trend and the diversification index (AD= Developing Asia; SSA=South Saharan Africa)

; Source: UNCTA and WDI

While Figure 1 provided an interesting picture of how the Aid-for-Trade and Export Concentration Index variables evolved over the period 1995-2019 however, they do not give an overview of the correlation pattern between these variables. The empirical analysis would make it possible to verify whether this correlation indeed reflects a causality in terms of the positive impact of Aid for Trade on the diversification of export products.

Table 1: Descriptive for the two country samples

	Mean	Std. Dev.	Maximum	Minimum	Observations
DV	0.742615	0.106473	0.936281	0.353168	1974
DH	0.432524	0.221245	0.983312	0.075034	1983
HLP	2.71E+08	8.31E+08	1.04E+10	-8.97E+08	1924
GDP	1576287.	12680874	2.94E+08	1.000000	1991
FDI	8.22E+08	3.70E+09	5.06E+10	-1.02E+10	1991
FBC	22.11160	11.77365	69.52741	0.000000	1941
INST	34.47934	18.58097	97.20000	0.000000	1980
DEG	63.19352	17.22468	95.00000	0.000000	1959
IFL	13.64424	132.2477	4800.532	-31.5659	1990
HUM	586584.6	1518577.	35487541	0.000000	1928
POP	2.874265	1.946614	17.51095	-4.53657	1991

Source: Authors' computation by STATA 12.

In the whole sample of our study, the average trade aid for the years 1995 to 2019 is 2.17, as we can observe in Table 1. Consequently, the vertical average diversification index measured by the share of exports of manufactures in total exports was found to be 0.74 with a sampling range of 0.35 (minimum) and 0.93 (maximum). Likewise, the average horizontal diversification measured by the number of exporters produced in the SITC three-digit international trade classification is 0.43 with a minimum range of 0.07 and a maximum range of 0.98.

Table 2: Descriptive for the two country samples

	ASIA				AFRICA			
	Mean	Std. Dev.	Maximum	Minimum	Mean	Std. Dev.	Maximum	Minimum
DV	0.602484	0.230480	0.983312	0.075034	0.454371	0.212	0.960	0.112
DH	0.703175	0.122371	0.903018	0.353168	0.370405	0.081	0.936	0.454
HLP	2.945303	0.100585	3.138333	2.292887	53.32838	54.42	691.924	-11.966
GDP	3689602.	19212313	2.94E+08	1.000000	1939.730	2857.334	22942.58	102.598
FDI	1.93E+09	5.48E+09	5.06E+10	-102000	3.778168	7.662	103.3374	-8.70307
FBC	22.21458	14.38116	69.52741	1.000000	21.96709	9.388556	60.15617	0
INST	45.04541	20.94167	97.20000	0.000000	26.40663	11.42469	59.10000	7
DEG	69.48565	17.80587	95.00000	0.000000	58.68473	15.22822	91.10000	10
IFL	6.278113	13.54438	295.3677	-26.1	13.29195	88.02217	2630.123	-29.6911
HUM	33.60064	22.34461	57.63715	0.000000	1054749.	1935007.	35487541	6989
POP	1.829523	1.788374	17.51095	-4.53657	3.623032	1.659055	17.49907	-3.47999

Source: Authors' computation by STATA 12.

To examine the gap between developing Asia and sub-Saharan Africa, it is much better to look at the descriptive statistics of the sub-samples, as shown in Table 2. The results show us that the African continent benefits the most from trade aid compared to the less developed Asian countries. The average trade aid for sub-Saharan Africa is estimated at 53.32 compared to 2.94 for developing Asian countries. This can be explained by the low GDP of sub-Saharan African countries. These results agree with Figure 1.

Regarding diversification, as measured at the average, Asia the sub-sample shows a vertical diversification of 0.6. At the same time, sub-Saharan Africa has a vertical diversification average of around 0.4, verify that developing Asia has made a significant and dynamic transformation of its economy towards the manufacturing sector. In contrast, sub-Saharan Africa has achieved very little economic structural change and, therefore, manufacturing exports of total exports in sub-Saharan Africa are only 0.3 compared to 0.7 in developing Asia.

Empirical Results

The empirical results of the total sample see Table 1 confirm that Aid for Trade positively impacts the vertical and horizontal diversification of export products. That is, it promotes the diversification of export products. If we consider the significance level of 10% (a positive impact on the diversification of export products): a \$ 1 increase in real Aid for Trade is associated with a decrease of 0.0315 points in vertical diversification and 0.0034 points in horizontal diversification.

As for the GDP, it has a positive influence on the vertical diversification of export products. An increase of 1% of GDP would lead to a decrease in the contraction of export products by 0.0064%. On the other hand, Commercial freedom favors the vertical diversification of export products, and its increase of 1% would lead to a decrease in the contraction of exports by 0.0018%.

On the other hand, inflation has a negative influence on vertical diversification. Inflation of one point would lead, all things being equal, to a decrease in the concentration of exported products by -0.044%.

FDI significantly and positively influences the vertical and horizontal diversification of export products. More precisely, when FDI increases by 1%, the concentration decreases by 6.01% horizontal diversification of export products. At the significance level of 1%, we can consider that education has a significant and positive influence on vertical diversification. An increase in the education rate of one point would lead to a decrease in the concentration of exported products by 0.014%. Human capital is a negative influence at the 10% threshold on horizontal diversification. An increase in the schooling rate by one point would result in a concentration of exported products of 1.38%. Gross capital formation is significantly positive at the 5% threshold for vertical diversification and significantly positive at the 1% threshold for horizontal diversification. Population growth is significantly positive at the threshold at the 1% threshold on vertical diversification. An increase of one point in the population would lead to a decrease in the concentration of exported products of 0.017%.

Table 3: Regression results for all countries

Variables	Vertical Diversification	Horizontal diversification
HELP	0.0315*** (0.0024)	0.00342*** (0.00064)
GDP	0.00646* (0.00275)	-0.00256 (0.001336)
FDI	0.00203 (0.001643)	6.01E-12*** (6.06E-13)
FBC	0.001426** (0.000448)	0.001757*** (0.000197)
INST	0.000464 (0.000318)	-4.12E-05 (0.000147)
DEG	0.00182*** (0.00031)	0.00013 (0.000131)
INFLA	-0.04422*** (0.002934)	8.87E-06 (1.61E-05)
HUM	0.014551*** (0.00302)	-1.38E-08* (5.59E-09)
POP	0.017092*** (0.004457)	-0.00023 (0.001297)
C	1.11151*** (0.052538)	0.801075*** (0.013661)
Observations Number	1529	1807
R²	0.147	0.136

Source: Authors' computation by STATA 12.

Notes. *p-value < 10%; **p-value < 5%; ***p-value < 1%.

The results in Table 2 give a comparative overview for each study sub-sample. GDP is significantly positive in both sample groups; it plays a large role in horizontal and vertical diversification in countries of sub-Saharan Africa and even for developing countries in Asia. This title, the creation of a new export line in Sub-Saharan Africa, increases per capita GDP. This confirms the theory that the number of products exported allows an economy that exports several goods to protect itself against external shocks. The effect of export lines could be higher on GDP growth in Sub-Saharan Africa if it were linked to innovation. A greater number of exporting sectors can also raise the productivity of the entire production system because of the upstream and downstream links through which technological transfer passes. These, in turn, create strong incentives for the creation of new activities complementary to exporting activities and self-sustaining diversification.

These results show that export diversification is an alternative for stable and sustainable growth for the countries of sub-Saharan Africa. Indeed, the diversification of exports from sub-Saharan African countries goes beyond a shift from a predominantly agricultural export structure to one predominantly industrial, making it possible to limit the deterioration of terms—exchange on the income generated by trade. Thus the contribution of export diversification to growth must be stable and sustainable. According to Levchenko and Di Giovanni (2009), diversification must be a means of stabilizing export income over the long term in the face of high elasticity demands and very volatile market prices. According to NAPO (2019), the stabilization of export income induced by diversification would make it possible to plan investments, guarantee an import capacity, and encourage the creation of new exportable activities and, in turn, contribute to long-term growth.

The aid variable is significantly positive for developing Asian countries for vertical and horizontal diversification; on the other hand, significantly negative for sub-Saharan African countries for horizontal and vertical diversification, respectively. Therefore, the empirical results indicate that, unlike the previous assumptions, foreign aid may not always have an anti-export bias due to a disease effect provoking by currency inflation and appreciation of the exchange rate. Real change. The results indicate that foreign aid can play a positive role in promoting vertical and horizontal diversification of exports if properly managed.

Foreign direct investment is positively significant on vertical diversification and negatively positive on horizontal diversification for developing Asian countries. This can be explained by the experience of emerging economies, especially FDI-oriented economies in East Asia, which confirms that FDI and domestic investment are complementary. For example, FDI would play a complementary

role with domestic investment by working with local enterprises in the form of joint ventures. Overall, there is a consensus that the beneficial aspects of FDI outweigh the cost. However, the increased productivity of FDI only holds when the host country has a minimum threshold of human capital. Thus, FDI contributes to export diversification only when sufficient absorptive capacity for advanced technologies is available in the host economy. However, the African region has failed to attract a large amount of FDI compared to the regions of East Asia and Latin America, mainly because Africa lacks adequate skilled labor that can participate in the investment sectors.

The gross formation of the capital plays a very important role in the whole two samples; it is positively significant on the vertical and horizontal diversification for sub-Saharan Africa and the countries of developing Asia. These results are the same as theoretical predictions. Investment and human capital allow, according to economic theory, in this case, the theory of endogenous growth, to stimulate economic growth. However, several factors contribute to investment and human capital formation in sub-Saharan Africa and Asia, having positive and significant effects on horizontal and vertical diversification. This phenomenon is explained by the fact that the transformation of manufacturers allows Asian countries to take advantage of manufacturers' positive effects on the growth of GDP per capita.

Trade freedom is significantly negative on horizontal diversification for developing Asian countries, and the same result is displayed for sub-Saharan African countries on horizontal diversification. These results seem a little surprising to us for the developing countries of Asia and but they will not be able to surprise us for the countries of sub-Saharan Africa. Because the Degree of freedom of trade in a given state is an influencing factor (tariffs, quotas, or other government interventions), many countries suffer from exorbitant taxes.

The inflation variable is significantly positive on horizontal and vertical diversification for developing Asian countries at the 1% threshold for the two dependent variables. However, it should be noted that high levels of inflation undermine the prospects for diversification, and under such circumstances, the trend is towards increased concentration with little openness to new export sectors.

Table 4: Comparison of developing countries in Asia and sub-Saharan Africa

	<i>ASIA</i>		<i>AFRICA</i>	
<i>Variable</i>	Horizontal Diversification	Vertical Diversification	Horizontal Diversification	Vertical Diversification
<i>HELP</i>	-1.0765*** (0.0577)	-0.14092*** (0.041383)	0.00074* (0.12250)	8.58E-05** (2.96E-05)
<i>GDP</i>	2.6709*** (3.73E-10)	5.34E-10*** (1.39E-10)	1.37E-05*** (0.122503)	3.90E-06*** (1.06E-06)
<i>FDI</i>	-1.85E-12* (8.77E-13)	6.4612*** (6.00E-13)	-0.00059 (0.000725)	-0.00024 (0.000239)
<i>FBC</i>	0.001075* (0.000466)	0.002197*** (0.000291)	0.002049*** (0.000494)	0.001729*** (0.000204)
<i>INST</i>	0.000363 (0.000336)	-0.00024 (0.000185)	0.000638 (0.00039)	-0.00018 (0.000158)
<i>DEG</i>	-0.00099* (0.00044)	-0.00016 (0.000233)	-0.00134*** (0.000284)	9.79E-05 (9.52E-05)
<i>INFLA</i>	0.002547*** (0.000567)	0.000635** (0.000201)	3.34E-05 (4.60E-05)	9.26E-06 (1.27E-05)
<i>HUM</i>	0.00138*** (0.000331)	0.00053** (0.00018)	-2.31E-08*** (5.00E-09)	-8.02E-09 (1.27E-05)
<i>POP</i>	0.001445 (0.003918)	-0.00348 (0.002341)	1.97E-09* (8.61E-10)	-2.78E-10 (4.86E-10)
<i>C</i>	3.590355*** (0.172982)	1.191547*** (0.122503)	0.798573*** (0.04616)	0.882884*** (0.023008)
<i>Nombre observations</i>	1 826	1 826	1049	1049
<i>R²</i>	0.286193	0.03854	0.132212	0.11119

Source: Authors' computation by STATA 12.

Notes. * p - value <10%; ** p-value <5%; *** p - value <1%.

Human capital is significantly positive at a 1% threshold on horizontal diversification and significantly positive at a 5% threshold on vertical diversification for developing Asian countries. This again implies that the countries of this region have invested considerably in the education system. sub-Saharan African countries and human capital is significantly negative on horizontal diversification. Evidence from the analysis of sub-samples from sub-Saharan Africa confirmed that the education factor does not contribute to improving horizontal diversification. Again, this implies that SSA needs to invest more in education.

Population growth is significantly positive at the 10% threshold on horizontal diversification for sub-Saharan African countries. This is also in line with the “endogenous growth theory” proposition that countries can benefit from a larger scale than with a larger population and larger market size.

Conclusion

The present study analyzed the effect of aid for trade on the vertical and horizontal diversification of exports in forty-six (46) countries in sub-Saharan Africa and thirty-seven (37) developing countries in Asia without China. The objective of this study was to find out whether Aid for Trade is a determinant of vertical and horizontal diversification processes in the economies of the countries of sub-Saharan Africa and the developing countries of Asia. The methodology adopted is that of the generalized method of moments (GMM). The results show, for the entire sample, that aid for trade has a positive effect on the horizontal and vertical diversification of exports for our entire sample, in particular positive and significant effects on per capita GDP growth, training gross capital, commercial freedom, human capital, and population growth. In the sub-sample of sub-Saharan Africa, aid for trade has a positive impact on vertical and horizontal diversification and the other variables of the occurrence GDP by habitat, FDI, gross capital formation, and human capital on the other hand, in the sub-sample of Asian countries aid hurts horizontal and vertical diversification; moreover, GDP, FDI, gross capital formation, human capital, population growth, and inflation have a positive influence. The policy implications of this study are that scaling up Aid for Trade flows would genuinely help recipient countries encourage diversification of their export baskets, which better integrate into the multilateral trading system. This study recommends that aid-for-trade recipient countries follow the strategy of vertical and horizontal export diversification, mainly by supporting upstream and downstream linkages with higher value-added resource-based industries and gradually shifting production and exports of customary products to more dynamic products by developing a competitive advantage in the international market.

Declaration of Conflicting Interests.

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Data sources

Variables	Indicator	source
DIV/V and H	Represents respectively horizontal and vertical diversification of exports	UNCTADstat
HELP	Public for development net received per capita	WDI Database
GDP	GDP / capita	WDI Database
FDI	Foreign direct investment	WDI Database
FBC	Gross capital formation	WDI Database
INST	The measure of the institutional quality of a country	Heritage Foundation
DEG	Degree of freedom of trade	Heritage Foundation
INFLA	Inflation	WDI Database
HUM	The average gross enrollment rate in secondary schools.	WDI Database
POP	The size of the total population	WDI Database